

What is claimed is:

- 1 1. A chemical process for the catalytic reduction of raw organic materials that include  
2 higher molecular weight organic compositions, comprising the steps of:
  - 3 a) introducing said organic material into a pressurized aqueous reactor  
4 system having a pump that can generate a pressure of about 200-250  
5 atmospheres;
  - 6 b) heating said mixture in said reactor system in the presence of super-  
7 critical water under high pressure and temperature;
  - 8 c) maintaining said organic material at a temperature of about 400-525° C  
9 for a sufficient period of time, such that said organic material is  
10 chemically transformed into a mixture comprising lower molecular  
11 weight liquid hydrocarbons of reduced viscosity, carbon dioxide  
12 and, when protein or other nitrogenous compounds are present in  
13 said organic material, amines; and
  - 14 d) wherein said chemical transformation occurs in a single reactor zone of  
15 said reactor system.
- 1 2. The process of claim 1, wherein said reactor system further comprises one or more  
2 materials that are inert to said organic materials, their intermediate reaction  
3 materials, and final products of said process.
- 1 3. The process of claim 1, wherein said reactor system further comprises cooling means  
2 exiting an autoclave area.
- 1 4. The process of claim 1, wherein hydrolysis and decarboxylation occur at a temperature  
2 of about 200-430° C.
- 1 5. The process of claim 4, wherein super-critical water with a dielectric constant of  $\psi = 2$ -  
2 5 is miscible with hydrocarbons.
- 1 6. The process of claim 1, wherein said reactor is maintained at a temperature of about  
2 430-500° C.
- 1 7. The process of claim 1, wherein said catalytic reduction reactions occur simultaneously,  
2 independently, in concert or in cascade fashion.

1 8. The process of claim 1, wherein said catalytic reduction reactions occur within about 3-  
2 10 minutes.

1 9. The process of claim 1, further comprising the step of physical filtration of solids from  
2 liquid phases.

1 10. The process of claim 1, further comprising the step of separating lower viscosity  
2 constituents from each other by fractional distillation.

1 11. The process of claim 1, further comprising the step of separating combined inorganic  
2 phase and metals-tars-organo-sulfur contaminants by centrifugation.

1 12. The process of claim 1, further comprising the step of adding glycerol as a desiccant  
2 for drying generated hydrocarbons, and as an absorbent for amines, such that said  
3 dried hydrocarbons can be separated before fractional distillation of liquid phase  
4 products.

1 13. The process of claim 1, further comprising the steps of precipitating generated carbon  
2 dioxide by lime water, and trapping amines as ammonium salts, thereby controlling  
3 amine odors.

1 14. The process of claim 1, wherein said organic matter is selected from the group  
2 consisting of:

3 a) plastics;

4 b) petroleum crude heavy oils;

5 c) kerogens;

6 d) tar sands;

7 e) shale;

8 f) bio-masses;

9 g) animal fats;

10 h) triglycerides;

11 i) lipids;

12 j) animal excrement;

13 k) vegetable wastes;

14 l) sludges;

15 m) organic wastes;

16 n) any similar organic matter, which is suitable for use in said catalytic  
17 reduction process.

1 15. The process of claim 1, wherein said organic material is added in the form of an  
2 aqueous mixture of about 10-50% by weight.

1 16. The process of claim 1, further comprising the step of recycling unconsumed organic  
2 materials within said reactor system.

1 17. The process of claim 1, further comprising the step of pre-heating said organic  
2 material to about 250° C or above, before said organic material is introduced into  
3 said reactor system.

1 18. The process of claim 17, further comprising the step of recycling waste heat from said  
2 process to pre-heat said organic material.

1 19. The process of claim 1, wherein animal or vegetable derived pathogens are destroyed  
2 by sterilization at super-critical temperatures and pressures.

1 20. The process of claim 1, wherein inorganic and cellulose fractions of animal or  
2 vegetable waste are transformed into nitrogen depleted carbonaceous compost,  
3 thereby providing solid compost that can be applied to the land as soil builder or  
4 burned as a fuel.

1 21. The process of claim 1, wherein the viscosity of said organic material is reduced by  
2 conversion of 200-300° C-sensitive C<sub>n</sub> esters, thioesters, amides, or amino acids to  
3 C<sub>n-1</sub> hydrocarbons and/or amines, respectively.

1 22. The process of claim 1, wherein the viscosity of said organic material is reduced by  
2 thermolytic cracking of the more labile carbon-carbon and carbon-sulfur bonds at  
3 400-500° C.



- 1 36. The process of claim 1, wherein chemically solubilized wood extracted lignin is  
2 chemically transformed into non-aqueous soluble liquid hydrocarbon and solid  
3 carbonaceous fuel.
- 1 37. The process of claim 36, wherein Kraft sulfide ions are oxidized into sulfate ion.
- 1 38. The process of claim 36, wherein black liquor need not be concentrated in order to  
2 separate chemically solubilized lignin from an aqueous phase.